

ABSTRACT OF THE DISCLOSURE

A method of depositing boron carbide on an aluminum substrate, particularly useful for a plasma etch reactor having interior surfaces facing the plasma composed of boron carbide, preferably principally composed of B_4C . Although in this application, the boron carbide may be a bulk sintered body, in the method of the invention it may be a layer of boron carbide coated on an aluminum chamber part. The boron carbide coating may be applied by thermal spraying, such as plasma spraying, by chemical vapor deposition, or by other layer forming technique such as a surface converting reaction. The boron carbide is highly resistant to high-density plasma etchants such as BCl_3 . The plasma sprayed coating is advantageously applied to only a portion of an anodized aluminum wall. The boron carbide may be sprayed over the exposed portion of an aluminum substrate over which the anodization has been removed. A band of the aluminum substrate at the transition between the anodization and the boron carbide is roughened prior to anodization so that the boron carbide sticks to the correspondingly roughened surface of the anodization. Alternatively, the entire wall area of the anodized aluminum to be coated is roughened, and the boron carbide is sprayed over the anodization.